AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1-13 (Cancelled)

14. (Original) An apparatus for generating a variable frequency clock signal for synchronously writing data to sectors on a rotating disk in a disk storage device, the apparatus comprising:

a timing apparatus for determining the period of time between two adjacent sectors, wherein the period of time between two adjacent sectors relates to phase rotation;

a phase-locked loop, responsive to a reference frequency for providing an output clock signal; and

an interpolator for adjusting the output clock signal responsive to the period of time between two adjacent sectors for synchronously writing data to the rotating disk.

15. (Original) The apparatus of claim 14, wherein each sector has a synchronization mark, and wherein the timing apparatus for determining the period of time between sectors measures the time between two consecutive synchronization marks.

16. (Original) The apparatus of claim 14, wherein the timing apparatus provides an average of the periods between a plurality of synchronization marks.

17. (Original) The apparatus of claim 14, wherein the phase-locked loop further comprises a phase detector, a low pass filter, a voltage controlled oscillator, and a divider, said

divider being located in a feedback portion of the phase-locked loop.

18-27 (Cancelled)

28. (Original) A method for generating a variable frequency clock signal for synchronously writing data to sectors on a rotating disk in a disk storage device, wherein each sector has a synchronization mark, the method comprising:

(a) determining a period of time between two adjacent sectors, wherein the period of time between two adjacent sectors relates to phase rotation;

(b) generating an output clock signal, responsive to a reference frequency;

(c) interpolating the output clock signal from step (b) in response to the period of time between two adjacent sectors to form an adjusted clock output signal, wherein step (b) is further responsive to the output clock signal.

29. (Original) The method of claim 28, wherein determining the period of time between sectors measures the time between two consecutive synchronization marks.

30. (Original) The method of claim 28, wherein determining the period of time between sectors provides an average of the periods between a plurality of synchronization marks.

31-59 (Cancelled)

60. (Original) An apparatus for generating a variable frequency clock signal for synchronously writing data to sectors on a rotating disk in a disk storage device, the apparatus comprising:

timing apparatus for determining a period of time between two adjacent sectors, wherein

the period of time between two adjacent sectors relates to phase rotation;

timing means having a feedback loop, responsive to a reference frequency for providing an output clock signal;

an interpolation means for adjusting the output clock signal responsive to the period of time between two adjacent sectors for synchronously writing data to the rotating disk.

61. (Original) The apparatus of claim 60, wherein each sector has a synchronization mark, and wherein the means for determining the period of time between sectors measures the time between two consecutive synchronization marks.

62. (Original) The apparatus of claim 60, wherein the means for determining the period provides an average of the periods between a plurality of synchronization marks.

63. (Original) The apparatus of claim 60, wherein the timing means further comprises a phase detector, a low pass filter, a voltage controlled oscillator, and a divider, said divider being located in a feedback loop.

64-99 (Cancelled)

100. (New) An apparatus for generating a variable frequency clock signal for synchronously writing data to sectors on a rotating disk in a disk storage device, the apparatus comprising:

a timing apparatus for determining the period of time between two adjacent sectors, wherein the period of time between two adjacent sectors relates to phase rotation;

a phase-locked loop, responsive to a reference frequency for providing an output clock

signal;

a first interpolator for adjusting the output clock signal responsive to the period of time between two adjacent sectors, wherein the first interpolator is located within the phase-locked loop; and

a second interpolator, responsive to a pre-compensation adjustment and connected to the phase-locked loop for modifying the output clock signal for synchronously writing data to the rotating disk..

101. (New) The apparatus of claim 100, further comprising a selector for selecting between a read mode and a write mode.

102. (New) The apparatus of claim 101, wherein the read mode is configured to connect the first interpolator to an output of the phase-locked loop.

103. (New) The apparatus of claim 100, wherein each sector has a synchronization mark, and wherein the timing apparatus for determining the period of time between sectors measures the time between two consecutive synchronization marks.

104. (New) The apparatus of claim 100, wherein the timing apparatus provides an average of the periods between a plurality of synchronization marks.

105. (New) The apparatus of claim 100, wherein the phase-locked loop further comprises a phase detector, a low pass filter, a voltage controlled oscillator, and a divider, said divider being located in a feedback portion of the phase-locked loop.

106. (New) The apparatus of claim 100, wherein the first interpolator is located in the

feedback portion of the phase locked loop.

107. (New) An apparatus for generating a variable frequency clock signal for synchronously writing data to sectors on a rotating disk in a disk storage device, the apparatus comprising:

a timing apparatus for determining the period of time between two adjacent sectors, wherein the period of time between two adjacent sectors relates to phase rotation;

a selector for selecting between a read mode and a write mode;

a phase-locked loop, responsive to a reference frequency for providing an output clock signal;

a first interpolator for adjusting the output clock signal responsive to the period of time between two adjacent sectors, wherein the first interpolator is located within the phase-locked loop; and

a second interpolator, responsive to a pre-compensation adjustment and connected to the phase-locked loop for modifying the output clock signal for synchronously writing data to the rotating disk.

108. (New) The apparatus of claim 107, wherein each sector has a synchronization mark, and wherein the timing apparatus for determining the period of time between sectors measures the time between two consecutive synchronization marks.

109. (New) The apparatus of claim 107, wherein the timing apparatus provides an average of the periods between a plurality of synchronization marks.

110. (New) The apparatus of claim 107, wherein the phase-locked loop further comprises a phase detector, a low pass filter, a voltage controlled oscillator, and a divider, said divider being located in a feedback portion of the phase-locked loop.

111. (New) The apparatus of claim 107, wherein the write mode is configured to connected the first interpolator in the feedback portion of the phase locked loop.

112. (New) The apparatus of claim 107, wherein the read mode is configured to connect the first interpolator to an output of the phase-locked loop.

113. (New) An method for generating a variable frequency clock signal for synchronously writing data to sectors on a rotating disk in a disk storage device, wherein each sector has a synchronization mark, the method comprising:

(a) determining a period of time between two adjacent sectors, wherein the period of time between two adjacent sectors relates to phase rotation;

(b) generating an output clock signal, responsive to a reference frequency;

(c) interpolating the output clock signal from step (b) in response to the period of time between two adjacent sectors to form an adjusted clock output signal, wherein step (b) is further responsive to step (c); and

(d) interpolating the adjusted clock output signal from step (c) in response to a pre-compensation adjustment for modifying the output clock signal to generate a variable clock signal.

114. (New) The method of claim 113, further comprising selecting between a read mode and a write mode.

115. (New) The method of claim 114, wherein the read mode is configured to interpolate the output clock signal from step (b) to provide the variable clock signal, and wherein step (b) is responsive to the output clock signal.

116. (New) The method of claim 113, wherein determining the period of time between sectors measures the time between two consecutive synchronization marks.

117. (New) The method of claim 113, wherein determining the period of time between sectors provides an average of the periods between a plurality of synchronization marks.

118. (New) An method for generating a variable frequency clock signal for synchronously writing data to sectors on a rotating disk in a disk storage device, wherein each sector has a synchronization mark, the method comprising:

(a) determining a period of time between two adjacent sectors, wherein the period of time between two adjacent sectors relates to phase rotation;

(b) selecting between a read mode and a write mode;

(c) generating an output clock signal, responsive to a reference frequency;

(d) interpolating the output clock signal from step (c) in response to the period of time between two adjacent sectors to form an adjusted clock output signal; and

(e) interpolating the adjusted clock output signal from step (d) in response to a pre-compensation adjustment for modifying the output clock signal to generate a variable clock signal.

119. (New) The method of claim 118, wherein determining the period of time between sectors measures the time between two consecutive synchronization marks.

120. (New) The method of claim 118, wherein determining the period of time between sectors provides an average of the periods between a plurality of synchronization marks.

121. (New) The method of claim 118, wherein the write mode is configured for step (c) to be responsive to step (d).

122. (New) The method of claim 118, wherein the read mode is configured to interpolate the output clock signal from step (c) to provide the variable clock signal, and wherein step (c) is responsive to the output clock signal.

123. (New) A data recording disk drive system for generating a variable frequency clock signal for synchronously writing data to sectors on a rotating disk in a disk storage device, the apparatus comprising:

a disk having a surface for storing data thereon;

a controller for controlling rotational speed of the disk;

at least one head for reading or writing the data;

an actuator for positioning the head;

a communications channel for transmitting data to and from the at least one head;

a timing apparatus for determining a period of time between two adjacent sectors, wherein the period of time between two adjacent sectors relates to phase rotation;

a phase-locked loop, responsive to a reference frequency for providing an output clock signal;

a first interpolator for adjusting the output clock signal responsive to the period of time between two adjacent sectors, wherein the first interpolator is located within the phase-locked

loop; and

a second interpolator, responsive to a pre-compensation adjustment and connected to the phase-locked loop for modifying the output clock signal for synchronously writing data to the rotating disk.

124. (New) The system of claim 123, further comprising a selector for selecting between a read mode and a write mode.

125. (New) The system of claim 124, wherein the read mode is configured to connect the first interpolator to an output of the phase-locked loop.

126. (New) The system of claim 123, wherein each sector has a synchronization mark, and wherein the timing apparatus for determining the period of time between sectors measures the time between two consecutive synchronization marks.

127. (New) The system of claim 123, wherein the timing apparatus provides an average of the periods between a plurality of synchronization marks.

128. (New) The system of claim 123, wherein the phase-locked loop further comprises a phase detector, a low pass filter, a voltage controlled oscillator, and a divider, said divider being located in a feedback portion of the phase-locked loop.

129. (New) A data recording disk drive system for generating a variable frequency clock signal for synchronously writing data to sectors on a rotating disk in a disk storage device, the apparatus comprising:

a disk having a surface for storing data thereon;

a controller for controlling a rotational speed of the disk;

at least one head for reading or writing the data;

an actuator for positioning the head;

a communications channel for transmitting data to and from the at least one head;

a timing apparatus for determining the period of time between two adjacent sectors, wherein the period of time between two adjacent sectors relates to phase rotation;

a selector for switching between a read mode and a write mode;

a phase-locked loop, responsive to a reference frequency for providing an output clock signal;

a first interpolator for adjusting the output clock signal responsive to the period of time between two adjacent sectors, wherein the first interpolator is located within the phase-locked loop; and

a second interpolator, responsive to a pre-compensation adjustment and connected to the phase-locked loop for modifying the output clock signal for synchronously writing data to the rotating disk.

130. (New) The system of claim 129, wherein each sector has a synchronization mark, and wherein the timing apparatus for determining the period of time between sectors measures the time between two consecutive synchronization marks.

131. (New) The system of claim 129, wherein the timing apparatus provides an average of the periods between a plurality of synchronization marks.

132. (New) The system of claim 129, wherein the phase-locked loop further comprises

a phase detector, a low pass filter, a voltage controlled oscillator, and a divider, said divider being located in a feedback portion of the phase-locked loop.

133. (New) The system of claim 129, wherein the write mode is configured to connected the first interpolator in the feedback portion of the phase locked loop.

134. (New) The system of claim 129, wherein the read mode is configured to connect the first interpolator to an output of the phase-locked loop.

135. (New) A data recording disk drive system for generating a variable frequency clock signal for synchronously writing data to sectors on a rotating disk in a disk storage device, the apparatus comprising:

a disk having a surface for storing data thereon;

a controller for controlling a rotational speed of the disk;

at least one head for reading or writing the data;

an actuator for positioning the head;

a communications channel for transmitting data to and from the at least one head;

a timing apparatus for determining a period of time between two adjacent sectors, wherein the period of time between two adjacent sectors relates to phase rotation;

a phase-locked loop, responsive to a reference frequency for providing an output clock signal;

an interpolator for adjusting the phase-locked loop output clock signal responsive to the period of time between two adjacent sectors, wherein the interpolator modifies the output clock signal for synchronously writing data to a rotating disk.

136. (New) The system of claim 135, wherein each sector has a synchronization mark, and wherein the timing apparatus for determining the period of time between sectors measures the time between two consecutive synchronization marks.

137. (New) The system of claim 135, wherein the timing apparatus provides an average of the periods between a plurality of synchronization marks.

138. (New) The system of claim 135, wherein the phase-locked loop further comprises a phase detector, a low pass filter, a voltage controlled oscillator, and a divider, said divider being located in a feedback portion of the phase-locked loop.

139. (New) An apparatus for generating a variable frequency clock signal for synchronously writing data to sectors on a rotating disk in a disk storage device, the apparatus comprising:

timing apparatus for determining a period of time between two adjacent sectors, wherein the period of time between two adjacent sectors relates to phase rotation;

timing means having a feedback loop responsive to a reference frequency for providing an output clock signal;

first interpolation means for adjusting the output clock signal responsive to the period of time between two adjacent sectors, wherein the first interpolator is located within the timing means; and

second interpolation means responsive to a pre-compensation adjustment and connected to the timing means for modifying the output clock signal for synchronously writing data to the rotating disk.

140. (New) The apparatus of claim 139, further comprising a means for selecting between a read mode and a write mode.

141. (New) The apparatus of claim 140, wherein the read mode is configured to connect the first interpolation means to an output of the timing means.

142. (New) The apparatus of claim 139, wherein each sector has a synchronization mark, and wherein the means for determining the period of time between sectors measures the time between two consecutive synchronization marks.

143. (New) The apparatus of claim 139, wherein the means for determining the period provides an average of the periods between a plurality of synchronization marks.

144. (New) The apparatus of claim 139, wherein the timing means further comprises a phase detector, a low pass filter, a voltage controlled oscillator, and a divider, said divider being located in the feedback loop.

145. (New) The apparatus of claim 139, wherein the first interpolation means is located in the feedback loop.

146. (New) An apparatus for generating a variable frequency clock signal for synchronously writing data to sectors on a rotating disk in a disk storage device, the apparatus comprising:

timing apparatus for determining a period of time between two adjacent sectors, wherein the period of time between two adjacent sectors relates to phase rotation;

means for selecting between a read mode and a write mode;

timing means having a feedback loop responsive to a reference frequency for providing an output clock signal;

first interpolation means for adjusting the output clock signal responsive to the period of time between two adjacent sectors, wherein the first interpolator is located within the timing means; and

second interpolation means responsive to a pre-compensation adjustment and connected to the timing means for modifying the output clock signal for synchronously writing data to the rotating disk.

147. (New) The apparatus of claim 146, wherein each sector has a synchronization mark, and wherein the means for determining the period of time between sectors measures the time between two consecutive synchronization marks.

148. (New) The apparatus of claim 146, wherein the means for determining the period provides an average of the periods between a plurality of synchronization marks.

149. (New) The apparatus of claim 146, wherein the timing means further comprises a phase detector, a low pass filter, a voltage controlled oscillator, and a divider, said divider being located in the feedback loop.

150. (New) The apparatus of claim 146, wherein the write mode is configured to connected the first interpolation means in the feedback loop.

151. (New) The apparatus of claim 146, wherein the read mode is configured to connect the first interpolation means to an output of the timing means.

152. (New) A data recording disk drive system for generating a variable frequency

clock signal for synchronously writing data to sectors on a rotating disk in a disk storage device, the apparatus comprising:

means for storing data on the rotating disk;

means for controlling a rotational speed of the disk;

means for reading data from the disk or writing data to the disk;

means for positioning the means for reading or writing data;

means for communicating data to or from the means for reading or writing data;

means for determining the period of time between two adjacent sectors, wherein the period of time between two adjacent sectors relates to phase rotation;

timing means having a feedback loop, responsive to a reference frequency for providing an output clock signal;

first interpolation means for adjusting the output clock signal responsive to the period of time between two adjacent sectors, wherein the first interpolator is located within the timing means; and

second interpolation means responsive to a pre-compensation adjustment and connected to the timing means for modifying the output clock signal for synchronously writing data to the rotating disk.

153. (New) The system of claim 152, further comprising a means for selecting between a read mode and a write mode.

154. (New) The system of claim153, wherein the read mode is configured to connect the first interpolation means to an output of the timing means.

155. (New) The system of claim 152, wherein each sector has a synchronization mark, and wherein the means for determining the period of time between sectors measures the time between two consecutive synchronization marks.

156. (New) The system of claim 152, wherein the means for determining the period of time provides an average of the periods between a plurality of synchronization marks.

157. (New) The system of claim 152, wherein the timing means further comprises a phase detector, a low pass filter, a voltage controlled oscillator, and a divider, said divider being located in the feedback loop.

158. (New) An data recording disk drive system for generating a variable frequency clock signal for synchronously writing data to sectors on a rotating disk in a disk storage device, the apparatus comprising:

means for storing data on the rotating disk;

means for rotating the disk;

means for controlling the rotational speed of the disk;

at least one means for reading data from the disk or writing data to the disk;

means for positioning the means for reading or writing data;

means for communicating data to the means for reading or writing data;

means for determining the period of time between two adjacent sectors, wherein the period of time between two adjacent sectors relates to phase rotation;

means for selecting between a read mode and a write mode;

timing means having a feedback loop, responsive to a reference frequency for providing

an output clock signal;

first interpolation means for adjusting the output clock signal responsive to the period of time between two adjacent sectors, wherein the first interpolation means is located within the timing means; and

second interpolation means, responsive to a pre-compensation adjustment and connected to the timing means for modifying the output clock signal for synchronously writing data to the rotating disk.

159. (New) The system of claim 158, wherein each sector has a synchronization mark, and wherein the means for determining the period of time between sectors measures the time between two consecutive synchronization marks.

160. (New) The system of claim 158, wherein the means for determining the period provides an average of the periods between a plurality of synchronization marks.

161. (New) The system of claim 158, wherein the timing means further comprises a phase detector, a low pass filter, a voltage controlled oscillator, and a divider, said divider being located in the feedback loop.

162. (New) The system of claim 158, wherein the write mode is configured to connected the first interpolation means in the feedback loop.

163. (New) The system of claim 158, wherein the read mode is configured to connect the first interpolation means to an output of the timing means.

164. (New) An data recording disk drive system for generating a variable frequency

clock signal for synchronously writing data to sectors on a rotating disk in a disk storage device, the apparatus comprising:

means for storing data on the rotating disk;

means for rotating the disk;

means for controlling the rotational speed of the disk;

at least one means for reading data from the disk or writing data to the disk;

means for positioning the means for reading or writing data;

means for communicating data to the means for reading or writing data;

means for determining the period of time between two adjacent sectors, wherein the period of time between two adjacent sectors relates to phase rotation;

timing means having a feedback loop, responsive to a reference frequency for providing an output clock signal;

interpolation means for adjusting the timing means output clock signal responsive to the period of time between two adjacent sectors, wherein the interpolation means modifies the output clock signal for synchronously writing data to a rotating disk.

165. (New) The system of claim 164, wherein each sector has a synchronization mark, and wherein the means for determining the period of time between sectors measures the time between two consecutive synchronization marks.

166. (New) The system of claim 164, wherein the means for determining the period provides an average of the periods between a plurality of synchronization marks.

167. (New) The system of claim 164, wherein the timing means further comprises a

phase detector, a low pass filter, a voltage controlled oscillator, and a divider, said divider being located in the feedback loop.

168. (New) The apparatus of claim 101, wherein the read mode is configured to disable the second interpolator.

169. (New) The apparatus of claim 101, wherein the write mode is configured to enable the first interpolator and to enable the second interpolator.

170. (New) The apparatus of claim 107, wherein the read mode is configured to disable the second interpolator.

171. (New) The apparatus of claim 107, wherein the write mode is configured to enable the first interpolator and to enable the second interpolator.

172. (New) The method of claim 114, wherein the read mode is configured to disable interpolating the adjusted clock output signal from step (c).

173. (New) The method of claim 114, wherein the write mode is configured to enable interpolating the output clock signal from step (b) and interpolating the adjusted clock output signal from step (c).

174. (New) The method of claim 118, wherein the read mode is configured to disable interpolating the adjusted clock output signal from step (d).

175. (New) The apparatus of claim 118, wherein the write mode is configured to enable interpolating the output clock signal from step (c) and interpolating the adjusted clock

output signal from step (d).

176. (New) The system of claim 124, wherein the read mode is configured to disable the second interpolator.

177. (New) The system of claim 124, wherein the write mode is configured to enable the first interpolator and to enable the second interpolator.

178. (New) The system of claim 129, wherein the read mode is configured to disable the second interpolator.

179. (New) The system of claim 129, wherein the write mode is configured to enable the first interpolator and to enable the second interpolator.

180. (New) The apparatus of claim 140, wherein the read mode is configured to disable the second interpolator.

181. (New) The apparatus of claim 140, wherein the write mode is configured to enable the first interpolator and to enable the second interpolator.

182. (New) The apparatus of claim 146, wherein the read mode is configured to disable the second interpolator.

183. (New) The apparatus of claim 146, wherein the write mode is configured to enable the first interpolator and to enable the second interpolator.

184. (New) The system of claim 62, wherein the read mode is configured to disable the second interpolator.

185. (New) The system of claim 62, wherein the write mode is configured to enable the first interpolator and to enable the second interpolator.

186. (New) The system of claim 158, wherein the read mode is configured to disable the second interpolator.

187. (New) The system of claim 158, wherein the write mode is configured to enable the first interpolator and to enable the second interpolator.